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ABSTRACT

A group of culturally deprived children with severe reading and behavior problems was systematically given tangible reinforcers while learning to read. Twelve second-grade and 12 third-grade boys from a rural and lower socioeconomic background were taught reading with the use of tangible reinforcers (E group). Four similar control groups (C group) were taught reading using the same teachers and materials, except that no tabgible reinforcers were used. There were eight groups with three subjects per group and two teachers--each teacher with one third-grade E group, one third-grade C group, one second-grade E group, and one second-grade C group. All groups received three 30-minute sessions a week from November to the end of the school year. The pretest and post-test was the Metropolitan Achievement Test--Primary or Elementary. The results indicated that the use of tangible reinforcers greatly improved the academic performance of the second-grade boys with learning problems, but had little effect (an improvement in word knowledge only) on the third-grade boys. Tables and references are given. (DE)

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The Use of Reinforcement Procedures in Teaching Reading to Rural Culturally Deprived Children

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One of the major problems in educating culturally deprived children is that such children, as a result of their home experiences, do not acquire "reinforcer systems" necessary for learning in the classroom. Educators typically rely on "intrinsic reinforcers" such as teacher's praise and attention which are generally effective in teaching normal middle-class children but have failed to maintain the attentional and work study skills necessary for learning in lower-class children. As Staats and others have indicated (Staats, 1964), reinforcers present in the classroom are inappropriate for many children.

When the classroom reinforcers are inadequate for a child he does not acquire the work study skills necessary for classroom learning. It is also the case that many culturally deprived children enter school with severe deficiencies in skills necessary for classroom learning. The child who enters school with language, cognitive, and perceptual deficiencies and for whom the classroom reinforcers are inadequate, fails in most learning situations. This child soon acquires a negative attitude toward school and learns to avoid school work by such means as not attending to the task, by responding to the task uncritically and impulsively, or, as is often the case, the child may become restless, disruptive and defiant. As the child continues to experience failure in school he learns additional ways of avoiding school work and more

undesirable learning takes place. The negative attitude toward school and the inappropriate behaviors learned in coping with failure interfer with classroom learning. As a result such children become severely retarded academically and are often considered as behavior or learning problems. In teaching the culturally deprived and learning disability children one of the major tasks of the educator is to employ reinforcement procedures that are effective.

There is considerable evidence to indicate that tangible reinforcers, such as candy, toys and money, are effective in teaching culturally deprived children how to read. Tangible reinforcers are rarely used in the classroom or corrective reading class other than for research purposes. Many educators argue that tangible reinforcers are not practical in the classroom; teachers cannot be easily trained to use them properly and the child becomes dependent upon them. There is considerable resistance to the use of tangible reinforcers as part of a behavior modification approach even though there is no research data to indicate that the criticisms are valid.

The purpose of the present study is to systematically apply reinforcers in teaching reading to a group of culturally deprived children who have severe reading and behavior problems. Paradigms for behavior modification research typically deal with changes in rate of occurance of desirable or undesirable behavior. The majority of studies in this area are case studies which describe modification of the behavior of an individual child or a small group of children. When a behavior modification approach is used in a classroom or with larger groups a control group is seldom employed. There is some concern that research using

single-subject evaluation or small-group evaluation without control groups creates doubt about the success of behavior modification. In teaching the culturally deprived or children with learning disabilities it might be argued that the individualized instruction, the structured situation or the type of task used are the important variables that effect change and that the reinforcement procedures are secondary. Using children with learning and behavior problems Hewett, Taylor and Artuso (1969) found no difference in reading achievement between an engineered classroom using tangible rewards and a control group. In the present study two groups of second-grade and two groups of third-grade children were taught reading with the use of tangible reinforcers (E group). In addition four similiar control groups (C group) were taught reading using the same teachers and materials except no tangible reinforcers were used.

Method

Subjects The Ss were 12 second- and 12 third-grade boys from rural and lower socio-economic backgrounds. All the teachers from the eight second- and third-grade classes in one of the local rural schools were asked to identify those children who were having difficulty learning how to read. From this list, a sample of 35 Ss was obtained consisting of the boys with the severest reading and behavior problems. It was decided to limit the present study to boys since the majority of Ss identified by the teachers were boys and the possible sex differences in learning how to read could thus be controlled. The Ss were randomly assigned to either an E or C group consisting of three Ss per group. There were eight groups with three Ss per group, and two teachers, each teacher with one third-grade E group, one third-grade C group, one second-grade E group, and one second-grade C group.

According to the results obtained on the Metropolitan Reading Test (Durost et. al., 1959) the second-grade Ss were reading at the 1.4 level and the 3rd grade Ss were reading at the 2.1 level when they entered the program. Eleven of the 24 Ss had been retained at least one year and all the Ss had a history of academic and behavioral problems. The Ss were described by their teachers as lacking motivation and interest in school, distractable, impulsive, disruptive and difficult to manage in the classroom. The approximate mean I.Q. for the group was 92 based on the testing of 15 Ss with the WISC or the Stanford-Binet.

Reinforcement Reinforcement was provided on a continuous basis (one correct response: one unit of reward) for all subjects during their first six lessons. Candy (M & M's) was deposited into a small cup beside the subject each time he responded correctly. Each subject in the E group went on a 1:2 reinforcement schedule after the first six lessons. At this time the Ss no longer received a tangible reward in the form of candy but rather they were given tokens (poker chips) or check marks. The tokens were used to earn prizes such as matchbox cars, airplanes, plastic animals and people and a variety of other toys. Some of the toys could be obtained with as few as ten tokens whereas others required 100 tokens. The child could choose the toy he desired. The reinforcement schedule for earning tokens continued to change during the school year.
Note: By the end of the school year the child was receiving one token for every 10 correct responses.

Reading materials One of the intentions of the present study was to provide a reading program that was not similar to the typical classroom

or corrective reading program. The standard basal readers or workbooks were not used since these were most likely associated with past failure. The reading materials used the first two months were developed by the two teachers. New words were introduced at the rate the Ss were able to learn them, some phonics were taught and the actual reading consisted of stories made up by the Ss and teachers. The emphasis during the early phase of the program was on enlarging the Ss sight vocabulary. In teaching sight vocabulary systematic word review, discrimination exercises and comprehension questions were used to consolidate learning and promote retention. One of the basic principals followed for both the E and C groups was that the goals of the program were clearly defined. The reading materials were carefully selected in order to efficiently achieve the desired goals.

After two months in the program the McGraw-Hill Programmed Reader (Sullivan and Buchanan, 1963) was introduced. This series contains some elements of both the phonics and whole word method of teaching reading but emphasis is primarily on teaching sound-symbol relationships and the phonetically regular words of our language.

The E and C groups were taught using the same materials, tasks and techniques. The only difference between the two groups is that the E group was given tangible reinforcers and the C group did not receive such rewards.

Procedure

The two experimental teachers were third year graduate students in school psychology. They had good backgrounds in psychology and learning theory but they had no teaching experience and very little background

in remedial reading. The Syracuse University Reading Clinic and the director of the corrective reading program in the participating school provide valuable suggestions in developing appropriate reading tasks. Each teacher was randomly assigned to a second- and third-grade E and C group.

The E and C groups each met for three 30 minute sessions a week. The program started in November and continued until the end of the school year. In addition to the Ss participation in the experimental reading program they remained in their regular classroom reading program. The only cooperation asked of the S regular classroom teacher was that she encourage and praise the child whenever possible, regardless of whether the S was in the E or C group. The purpose of the study and the experimental procedures were explained to the teachers and they were encouraged to discuss with the experimental teachers any problem the child might have during the school year. Such discussions did not occur and the amount of contact between the S's classroom teacher and the experimental teacher was minimal.

Prior to the reading program all the Ss were tested with either the Primary or Elementary Level of the Metropolitan Reading Test. Upon termination of the study the Ss were again given the Metropolitan Achievement Test. The analysis is based on changes in pre- and posttest achievement scores for both the E and C groups. A three factorial repeated measures analysis of variance was used to analyze the data for each of the four areas of achievement measured by the Metropolitan Achievement Test. If significant grade X treatment interactions or treatment main effects were found a 2 x 2 repeated measures ANOVA was used at each grade level to further analyze the data.

Results

The pre- and posttest means for each group are reported in Table 1.

The first analysis, which involved Word Knowledge achievement, showed a significant grade X treatment ($F = 5.70$, $df = 1,20$) and treatment X trials interaction ($F = 5.80$, $df = 1,20$). Since these results indicate differential effects of treatment between grade levels, the treatment effects were analyzed separately at each grade level. At the second-grade level a significant increase in scores across groups ($F = 10.75$, $df = 1,20$) and a significant treatment X trials interaction was found ($F = 7.46$, $df = 1,20$). The results of a 't' test indicated a significant increase in scores for the E group ($t = 4.74$, $df = 5$) and no change for the C group.

Insert Table 1 about here

At the third-grade level a significant treatment effect was found ($F = 18.71$, $df = 1,20$) and the treatment X trials interaction approached significance ($F = 3.85$, $df = 1,20$). The 7.5 increase in scores for the E group was significant ($t = 4.14$, $df = 5$) and the 3.3 change for the C group was not significant. Thus, in the area of Word Knowledge the second- and third-grade E groups showed significant increases in scores and the C group did not show any change during the school year.

The analysis of the achievement area Word Discrimination indicated a grade X trial interaction ($F = 10.96$, $df = 1,20$). Analyzing the results by grade level showed that the treatment effect in second grade approached significance ($F = 3.39$, $df = 1,20$). The E group at the second-grade level

made a significant increase of 10.5 on Word Discrimination ($t = 3.01$, $df = 5$). The increase of 4.3 made by the C group was not significant. Both the E and C groups showed declines on Word Knowledge scores at the third-grade level, however, the main effect across trials and the interaction were not significant.

The third area of achievement examined was Reading. A grade X treatment interaction ($F = 5.54$, $df = 1,20$), a grade X trials interaction ($F = 12.74$, $df = 1,20$) and a main effect across trials ($F = 4.33$, $df = 1,20$) was found. At the second-grade level the treatment X trials interaction approached significance ($F = 2.70$, $df = 1,20$) and the changes in scores across trials was highly significant ($F = 35.53$, $df = 1,20$). The second-grade E group showed an increase of 12.4 which was significant ($t = 6.20$, $df = 5$) and the C group showed a 7.0 change which was not significant ($t = 1.69$, $df = 5$).

The analysis of Reading scores at the third-grade level resulted in a significant treatment X trials interaction ($F = 5.49$, $df = 1,20$). It is interesting to note that the pre- and posttest scores were essentially the same for the third-grade E group whereas the pre- and posttest scores for the C group showed a significant decrease of 5.7 ($t = 2.85$, $df = 5$). In the area of Reading the differential effects of treatment depended on the S's grade level. The E groups showed an increase in second-grade and no change in third-grade. The second-grade C group made an increase which approached significance and the third-grade C group showed a significant decline.

A treatment X grade interaction ($F = 8.83$, $df = 1,20$), and a grade X trials interaction ($F = 17.00$, $df = 1,20$) was found using the Spelling

achievement scores. The treatment X trials interaction approached significance ($F = 3.41$, $df = 1,20$).

The results of the analysis at the second-grade level indicated that there was a significant main effect across trials ($F = 9.67$, $df = 1,20$). The E and C groups at the second-grade level showed a significant increase in Spelling scores ($t = 12.75$, $df = 5$ and $t = 2.90$, $df = 5$, respectively). The analysis of the Spelling scores at the third-grade level indicated no significant main effect or interaction. In the area of Spelling the second-grade Ss in both the E and C groups showed significant increases and the third-grade Ss made no appreciable gains.[1]

Discussion

The results indicated that the use of tangible reinforcers greatly improved academic performance for a group of second-grade boys with learning problems. The second-grade E subjects showed significant gains in the four areas of achievement and out performed the second-grade C groups who were taught using the same materials and procedures except for the reinforcers. Spelling was the only area where the second-grade C groups made a significant gain but this was not nearly as large as the gain made by the E group. The systematic application of tangible reinforcers did not have the same effect in the third grade. The only significant changes at the third-grade level were an increase by the E group on Word Knowledge and a decline by the C group on reading.

It is important to consider the effects of regression in evaluating change scores for a sample who's initial scores were below average. The pretest scores for the present sample were not regressed toward the mean which raises the question of whether or not the changes were due to

regression or treatment effects. In order to answer this question the change scores for second- and third-grade groups were correlated with initial test scores. A nonsignificant or positive correlation would indicate that the changes were due to treatment effects. The correlations between change scores and initial scores at the second-grade level were not significant except in the area of Spelling where a positive correlation was found. Thus, at the second grade level regression did not account for any of the change using the achievement measures, Word Knowledge, Word Discrimination and Reading. In the area of Spelling the results indicate that the Ss who had the highest Spelling scores at the beginning of the study were those who made the most progress. This is opposite of what would be predicted on the basis of regression effect. At the third-grade level a significant negative correlation was found between change scores and initial scores for Word Knowledge (-.73), Reading (-.72) and Spelling (-.63) which suggests that what little positive change occurred in the third grade was most likely due to regression affects.

In attempting to account for the fact that the tangible reinforcers were more effective with second-grade Ss it is necessary to look at the characteristics of the second- and third-grade Ss. At the beginning of the experiment all the Ss were disruptive, inattentive, and difficult to manage. Soon after the experiment began the second-grade E subjects became interested in the reading activities and as a result were much less disruptive and difficult to manage during the sessions. The attitude of the second-grade E subjects toward reading became more positive during the school year and they displayed more confidence in their ability to learn how to read. The classroom teachers of the second-grade E subjects reported that the Ss had more positive attitudes toward school and were

causing fewer problems in the classroom. The parents of the second-grade E subjects also reported changes in their child's attitude toward school. At the beginning of the project all the parents were asked to come to school for a conference with the experimental teacher. None of the 24 parents responded. However, by the end of the school year four of the six parents of the second-grade E subjects had visited the reading class. One mother, whose comment was quite typical indicated that she had to come to school to find out what was causing the remarkable change in her son's attitude toward school.

The tangible reinforcers were less effective in changing attitudes, interests and work study skills of the third-grade E subjects. The third-grade Ss had experienced more failure and the behaviors these Ss had learned in order to avoid failure situations were more difficult to change. The third-grade Ss continued to lack motivation and interest, were impulsive inattentive and disruptive during the entire school year. It is possible that the reading tasks, programmed reader and the reinforcers were inappropriate for these children.

The basis for the explanation of the differential effects of the tangible reinforcers is highly subjective. The speculation as to the differences in attitudes and work study skills between the second- and third-grade Ss were based on the subjective judgments of the experimental and classroom teacher. There is a need to replicate this study using similar Ss at different grade levels and to objectively observe and measure changes in behavior and attitudes that interfere with learning how to read.

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Table 1

Means for Pre- and Posttest Achievement Scores

		Achievement											
		Word Knowledge			Word Discrimination			Reading			Spelling		
		Pre	Post	Change	Pre	Post	Change	Pre	Post	Change	Pre	Post	Change
Second Grade	E	35.0	46.0	11.0**	37.3	47.7	10.4*	34.8	47.2	12.4**	31.8	48.7	16.9**
	C	31.7	32.7	1.0	31.5	35.8	4.3	29.5	36.5	7.0	28.0	36.0	8*
Third Grade	E	34.3	41.8	7.5**	45.2	40.3	-4.9	40.0	40.3	0.3	40.5	42.8	2.3
	C	38.3	41.7	3.4	43.0	40.7	-2.3	44.3	38.7	-5.6*	46.2	46.5	0.3

*p<.05
**p<.01

FOOTNOTES

[1] A correlation matrix involving the four areas of achievement at the second and third grades showed high intercorrelations at the second-grade level which ranged from .73 between Reading and Spelling to .93 between Word Discrimination and Spelling. At the third-grade level the only significant intercorrelations were between Word Discrimination and Spelling (.65) and between Word Knowledge and Word Discrimination (.69).